
REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 376-8496
SRP Section: 12.03-12.04 – Radiation Protection Design Features
Application Section: 12.3
Date of RAI Issue: 01/28/2016

Question No. 12.03-49

This question is a follow-up to RAI 8254, Questions 12.03-15, 12.03-18, and 12.03-19.

REQUIREMENTS AND GUIDANCE

10 CFR 52.47(a)(5) requires that the FSAR contain the kinds and quantities of radioactive materials expected to be produced in the operation and the means for controlling and limiting radioactive effluents and radiation exposures within the limits set forth in 10 CFR 20.

10 CFR 20.1101(b) requires that the licensee use to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA).

SRP 12.3-12.4 indicates that the applicant's radiation monitoring system should be designed to monitor the radiation levels in areas where radiation levels could become significant and where personnel may be present. The SRP also indicates that the reviewer will evaluate the placement of radiation monitors and ensure that each area and airborne radiation monitor should have a local audible alarm and that monitors located in high noise areas should also have visual alarms.

ANSI/ANS-HPSSC-6.8.1-1981, which the applicant references and which is referenced in the SRP indicates that, "Detectors shall be located in those areas which require entry or exit, or both, to be monitored or controlled for purposes of occupational radiation protection which are normally accessible, and where changes in plant conditions can cause significant increases in personnel exposure rate above that expected for the area. Detectors shall be located to best measure the representative exposure rates within the specific area so as to assist in minimizing exposure to personnel."

ISSUES

1. In the response to RAI 8254, Questions 12.03-15 and 12.03-19, the applicant indicated that the locations of the main steam line radiation monitors (RE-217 through RE-220) and new fuel storage area monitors (RE-245) shown in the FSAR Chapter 11 figures, were not actually the locations of the radiation detector (sensors). Instead the locations shown were the locations of the monitor electronics and display panels. Therefore, the applicant corrected the figures to show the actual location of the radiation detectors for these monitors. Since the initial FSAR showed the locations of the monitor electronics and display panels for these monitors, instead of the actual detector location, it is unclear if the locations of other monitors shown in the Chapter 11 figures are the locations of the actual radiation detector (sensor) or the location of the electronics and monitor displays, or both. In addition, in the response to Question 12.03-18, the applicant also changed the location of monitor RE-234B (Containment Upper Operating Area) without explanation, and it is unclear if this is also due to a similar issue.
 - a. Therefore, in accordance with the SRP and to ensure that the appropriate requirements and guidance are being met, please review all area radiation monitors listed in FSAR Table 12.3-6 and ensure that the location of each monitor in FSAR Figures 11.5-2A through 11.5-2Z provides the accurate location of the actual radiation detector (sensor). If not, please revise the figures, as appropriate, so that the location of each radiation detector (sensor) is shown in the figures. As an alternative to removing the locations of displays the applicant may choose to show the location of both the detectors and the electronics/display in the figures, if it is clear which location is the monitor and which the display.
 - b. Update FSAR Section 12.3.4.1.2 or 12.3.4.1.5 to state that the locations of the area monitors are shown in the FSAR 11.5-2 figures.
 - c. Since in some cases the electronics and display are located in separate rooms from the radiation monitors (sensors), please update the FSAR to provide additional information regarding if the local alarms will alarm at the locations of the radiation detectors, at the location of the electronics/display, or both. Also discuss in the FSAR how the design will ensure that the alarms will be in the appropriate locations to alert plant personnel to leave areas when high radiation levels are present and/or to prevent personnel from entering areas when high radiation levels are present, as appropriate. For example, if the alarm is in a separate room from where the detector and source(s) being measured are located, the alarm may not alert workers already in the room of the high radiation levels. Alternatively, it may be appropriate to have an alarm in the entrance room to certain areas with large radiation sources, to prevent workers from entering the area when high radiation levels are present. Ensure that the FSAR is clear where the local alarms will be located for each monitor, as part of the response.
2. In the response to Question 12.03-18, the applicant provides a proposed revision of FSAR Figure 11.5-2A, showing the elevations for the area radiation monitors in containment. However, in the response, the applicant did not provide the elevation of monitor RE-236 (Containment Personnel Access Hatch Area), which is also included in Figure 11.5-2A. In addition, while the applicant shows the elevations of the monitors,

they do not provide the physical locations of walls and equipment at each elevation, showing that each monitor is in a location best suited for detecting radiation in the area, which was the intent of Question 12.03-18, Part 1.

- a. Please include the elevation of monitor RE-236 in Figure 11.5-2A or provide a new figure showing the monitor at the appropriate elevation.
- b. Please provide an FSAR figure for each elevation of containment for which a monitor is located, showing the monitor's location at that elevation or update the FSAR to specify if the specific monitor elevations and locations shown for all monitors provide a clear view of the area and are at a location best for measuring the representative exposure rates within the specific area in accordance with ANSI/ANS-HPSSC-6.8.1-1981.

Response – (Rev. 3)

Sub question 1.a

The area radiation monitors listed in Table 12.3-6 have been thoroughly reviewed to correct the discrepancies and omissions.

Figures 11.5-2A through 11.5-2BB are revised to show the correct location of the radiation detectors (RE) and the monitor electronics/displays (RT). In the figures, RE/RT means that the detector and electronic/display are installed together adjacent to each other.

The location of RE-234B has been changed to the correct location. The location of RT-234B is shown in Figure 11.5-2M.

In addition, those monitors whose detector sensor locations and electronic parts are separately located have been noted in Table 1 below. This separation is done for the purpose of alerting and to help the operators or maintenance crew egress/ingress to and from an area prior to and/or after a radioactive contaminant spillage or an unanticipated radiation incident.

According to the response to RAI 8275-Question 12.03-34 (Rev 3), the name of Instrument Calibration Facility (ICF) will be changed to "Future Use". Therefore, the instrument calibration facility area monitor (RE-286) will be removed from DCD Tier 1 and Tier 2 (see Attachment).

Sub question 1.b

DCD Tier 2, Subsection 12.3.4.1.5 will be revised to state that the locations of the area monitors are shown in the Figures 11.5-2.

Sub question 1.c

For RE-231A, 232B, 233A, 234B, and 235, the local alarms are located at the locations of the radiation detectors (RE) and at the location of the electronics/display (RT). For other radiation monitors, the local alarms are located at the location of the RT. The detailed location and function of the alarm is described in Table 1 below. DCD Tier 2 Subsection 12.3.4.1.5 will be revised to discuss the location and function of the alarm.

Table 1 Area Radiation Monitors

Description	Tag No. ⁽¹⁾	Location (Building)	DCD Figure No.	Local Alarms ⁽¹⁾	Operational Note		
Post-accident primary sample room	RE/RT-205	Auxiliary Building	11.5-2D				
Normal primary sample room	RE/RT-285	Compound Building	11.5-2S				
Main steam and FW containment piping penetration area	RE/RT-237	Auxiliary Building	11.5-2L				
	RE/RT-238		11.5-2K				
Containment operating area	RE-231A	Containment Building	11.5-2A	One common combined RL/RAH (RL/RAH-1) for 231A, 232B, 233A, 234B is located inside and another one (RL/RAH-2) outside near the personnel access hatch. These are in addition to individual RL/RAH at each RT in the Auxiliary Building.	The common inbound alarm alerts the operation and maintenance crew in the containment to exit containment and also warns the crew outside to limit the access to the containment.		
	RT-231A	Auxiliary Building	11.5-2BB				
	RE-232B	Containment Building	11.5-2A				
	RT-232B	Auxiliary Building	11.5-2M				
Containment upper operating area	RE-233A	Containment Building	11.5-2A			One common combined RL/RAH (RL/RAH-1) for 231A, 232B, 233A, 234B is located inside and another one (RL/RAH-2) outside near the personnel access hatch. These are in addition to individual RL/RAH at each RT in the Auxiliary Building.	The common inbound alarm alerts the operation and maintenance crew in the containment to exit containment and also warns the crew outside to limit the access to the containment.
	RT-233A	Auxiliary Building	11.5-2BB				
	RE-234B	Containment Building	11.5-2A				
	RT-234B	Auxiliary Building	11.5-2M				
In-core instrument	RE/RL/RAH-235	Containment Building	11.5-2A	A local RL/RAH is at RE in addition to RL/RAH at RT outside the personnel access hatch.	The local alarm at the in-core instrument seal table area alerts the crew to exit the area and also warns the crew outside to limit access to the area inside containment.		
	RT-235	Auxiliary Building	11.5-2O				
Containment personnel access hatch area	RE-236	Containment Building	11.5-2A	A local RL/RAH is at RT outside the personnel access hatch.	This monitor alerts the crew outside about high radiation condition inside the containment.		
	RT-236	Auxiliary Building	11.5-2O				
Spent fuel pool area	RE/RT-241A	Auxiliary Building	11.5-2O				
	RE/RT-242B		11.5-2O				
New fuel storage area	RE/RT-245	Auxiliary Building	11.5-2O				
Hot machine shop	C-RE-293	Compound Building	11.5-2U	A local RL/RAH is at RE in addition to RL/RAH at RT	The local alarm at Hot machine shop alerts the crew to exit the area and also warns the crew outside to limit access to the area		
	C-RT-293		11.5-2U				

Description	Tag No. ⁽¹⁾	Location (Building)	DCD Figure No.	Local Alarms ⁽¹⁾	Operational Note
Radiochemistry lab	RE/RT-257	Compound Building	11.5-2S		
DELETED	DELETED	DELETED	DELETED	DELETED	DELETED
Main control room area	RE/RT-275	Auxiliary Building	11.5-2N		
TSC area	RE/RT-279	Auxiliary Building	11.5-2N		
Truck bay	C-RE-288	Compound Building	11.5-2T	A local RL/RAH is at RE in addition to RL/RAH at RT	The local alarm at Truck bay alerts the crew to exit the area and also warns the crew outside to limit access to the area
	C-RT-288				
	C-RE-289				
	C-RT-289				
Waste drum storage area	C-RE-292	Compound Building	11.5-2T	A local RL/RAH is at RE in addition to RL/RAH at RT	The local alarm at Waste drum storage area alerts the crew to exit the area and also warns the crew outside to limit access to the area
	C-RT-292				
Compound building dry active waste storage area	C-RE/RT-284	Compound Building	11.5-2T		

Notes:

1. In general, the electronic part (RT) of the area monitor is equipped with a beacon light (RL) and a horn alarm (RAH). Therefore, the RTs in the above table have RL and RAH as part of RT unless specifically noted otherwise.

Sub question 2.a

The elevation of RE-236 is at 160'-6". Figure 11.5-2A will be revised to show the elevation information.

Sub question 2.b

As responded to in RAI 368-8470, Question 14.03.08-14, the following description is to ensure that the locations of the monitors are located to provide unimpeded overview of the entire containment representative free volume:

"The containment operating area monitors (RE-231A and 232B) are located near at El. 160' directly above the refueling pool. These detectors monitor the refueling operation to detect a fuel handling accident condition.

The two monitors are azimuthally 180° apart and RE-234B is located just below the containment polar crane rail support girder near EL.230' while RE-233A is at EL. 200'. RE-234B has a wide open, unobstructed location for monitoring the entire containment free air volume. Access to RE-234B is relatively easy because of an intermediate maintenance platform, thus requiring only a short extension of caged ladder to reach the monitor.

RE-233A was initially located at EL. 288' at the reference plant. Access to this monitor was severely limited. The only way to access the monitor was either climbing down from the polar crane operator cab or climbing up from EL. 158' with a ladder. Both were perilously dangerous. As a result, it was decided at the reference plant to relocate and lower the monitor to an elevation that cleared the nearby structures. The closest one was the pressurizer compartment concrete wall approximately 35' away with TOC EL. 200'. This structure partially blocked the upper left hand quadrant of the containment air volume, but it had a clear open, unobstructed location for monitoring the lower two quadrant containment free air volume. RE-234B provides coverage of the upper left hand quadrant.

As responded to in RAI 225-8254, Question 12.03-18, the in-core instrument (ICI) area monitor, RE-235, is a radiation monitor for the ICI seal table area. The seal table is located at Elevation 130'-0" near the integrated head assembly lift rig. The monitor is located above the water level (concrete floor level) of 156'-0" and the monitor is located at 6'-6" off the 156' level to prevent submergence because the seal table area is flooded and is submerged under water during refueling operations. RE-235 is located directly overlooking the seal table.

The containment personnel access hatch area monitor, RE-236 is located on the containment wall near the personnel access hatch at Elevation 160'-6".

DCD Tier 2 Subsection 12.3.4.1.5 will be revised to ensure that all monitors in the containment building provide a clear view of the area of their respective intended functions.

Impact on DCD

DCD [Tier 1 Table 2.7.6.5-1](#), Tier 2 Subsections 12.3.4.1.3, 12.3.4.1.5, and [Table 12.3-6](#) will be revised. Figures 11.5-2A, 11.5-2D, 11.5-2K, 11.5-2L, 11.5-2M, 11.5-2N, 11.5-2O, 11.5-2R, 11.5-2S, 11.5-2T, 11.5-2U, and 11.5-2BB will be revised.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environmental Report.

APR1400 DCD TIER 1

RAI 116-8054 - Question 14.03.08-4

RAI 368-8470 - Question 14.03.08-14

RAI 116-8054 - Question 14.03.08-9

RAI 376-8496 - Question 12.03-49_Rev.3

Table 2.7.6.5-1

Radiochemistry Lab

Area Radiation Monitoring System Components List

Display & Alarm at MCR/RSR/Local

Description	Tag No ⁽¹⁾	Class ⁽²⁾			Range	Display/Alarm at MCR/RSR
		S	SE	E		
Post Accident Primary Sample Room	RE-205	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Normal Primary Sample Room	RE-285	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Main Steam & FW Containment Piping Penetration Area	RE-237 RE-238	N	II	N	10 ⁰ ~10 ⁵	Yes/Yes/Yes
Fuel Handling ACC & POST-ACC High Range Monitor In Containment	RE-231A RE-232B	3	I	A B A B	10 ⁻³ ~10 ²	Yes/Yes/Yes
	RE-233A RE-234B				10 ¹ ~10 ⁸	Yes/Yes/Yes
Incore Instrument	RE-235	N	II	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Containment Personnel Access Hatch Area	RE-236	3	I	A B	10 ⁻³ ~10 ²	Yes/Yes/Yes
Spent Fuel Pool Area	RE-241A RE-242B	N	II	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
New Fuel Storage Area	RE-245	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Hot Machine Shop	RE-293	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Low Level Lab	RE-257	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Instrument Calibration Facility	RE-286	N	II	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Main Control Room Area	RE-275	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
TSC Area	RE-279	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Truck Bay	RE-289	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Waste Drum Storage Area	RE-292	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes
Compound Building Dry Active Waste Storage Area	RE-284	N	III	N	10 ⁻³ ~10 ²	Yes/Yes/Yes

(mSv/hr)

Deleted

Retain

Deleted

- (1) The column "Tag No" is information only (not part of certified design).
- (2) S : Safety Class per ANSI/ANS-51.1; 1=SC-1, 2=SC-2, 3=SC-3, N=NNS
SE : Seismic Category; I, II, III
E : Electrical Class ; A, B, C, D=Class 1E Separation Division, N=Non-Class 1E

RE-288
RE-289

N	II	N
3	I	A B

Insert "A" on the attached page.

Truck Bay Area

Containment Operating Area	RE-231A RE-232B	3	I	A B	10 ⁻³ ~ 10 ²	Yes/Yes/Yes
Containment Upper Operating Area	RE-233A RE-234B	3	I	A B	10 ¹ ~ 10 ⁸	Yes/Yes/Yes

RAI 116-8054 - Quesiton 14.03.08-9

RAI 116-8054 - Quesiton 14.03.08-9_Rev.1

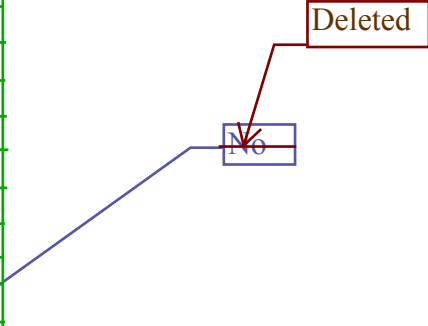
RAI 376-8496 - Question 12.03-49_Rev.3

A

Harsh Envir. Qual.
No
No
No
Yes
Yes
No
No
No
No
No
No
No
Component to be deleted
No
No
No
No
No

No

Deleted



APR1400 DCD TIER 2

RAI 376-8496 - Question 12.03-49

With regard to the criticality accident monitoring, the requirements in 10 CFR 50.68(b) (Reference 25) are followed to prevent criticality as described in Subsection 9.1.1.

12.3.4.1 Area Radiation Monitoring System12.3.4.1.1 Design Objective

The ARMS monitors the radiation levels in selected areas throughout the plant. Most area monitors are designed to warn operators and station personnel through visible and audible alarms when unusual radiological events occur. Some area monitors are designed to monitor the post-accident radiation level in areas where access to equipment that is important to safety may be necessary. These post-accident radiation monitors, shown in Section 7.5 and Table 7.5-1, are designed in accordance with NRC RG 1.97, Rev. 4 and NRC RG 1.206 (Reference 26).

Area radiation monitors have local visible and audible alarms. An additional visual indication lamp may be provided in high-noise areas if needed to provide reasonable assurance of prompt recognition by nearby personnel during high-radiation conditions.

12.3.4.1.2 Location of Area Radiation Monitors

Area radiation monitoring equipment is used to alert operators and station personnel of abnormally high-radiation conditions in an area and protect personnel from possible overexposure. The locations of the area monitors are based on the potential for significant radiation levels in an area. Area monitors are also located in areas where accident access to safety-related equipment may be required during post-accident conditions. Area radiation monitors are also used in special process applications. For example, area radiation monitors located next to the main steam lines are used to monitor for an SG tube leak or rupture and high-range area detectors are used to estimate the accident containment airborne activity and primary coolant activity.

12.3.4.1.3 General System Description

Area radiation monitors consist of microprocessors and Geiger-Mueller (G-M) tubes or ionization chambers for detecting gamma radiation. Each monitor using microprocessors

electronics/displays (RT)

RT

(RE)

APR1400 DCD TIER 2

RAI 376-8496 - Question 12.03-49

may be configured with one or more detectors and may cover multiple areas. Selection of detectors is based on the range needed for the particular monitoring application. Some areas may require extended or high-range detector configurations to cover special operational or post-accident monitoring functions.

Radiation level signals and alarms and operation status alarms are generated by each ~~monitor-microprocessor~~ ^{RT} for local alarm capability and transmittal to the information processing system (IPS), qualified indication and alarm system (QIAS), and other interfacing systems. The signals and alarms are recorded and can be retrieved by the operators using IPS. Radiation level signals are transmitted from the ~~microprocessor~~ via digital communication ports and analog outputs. Alarm relay contacts are provided to actuate alarms for radiation, high radiation, and operation status. ^{RT}

Table 12.3-6 lists the area radiation monitors and specifies the range, electrical class, and seismic category of each monitor.

Area monitors are located based on the expected frequency of access, occupancy time, and expected and potential radiation levels in plant work areas.

- a. Areas that are typically high-radiation areas but require little or no access (e.g., pipe chases) are not provided with an area radiation monitor.
- b. Areas that typically have a high frequency of access and are normally low-radiation areas, but are potentially high-radiation areas, are provided with an area radiation monitor. In accident conditions, areas such as corridors outside personnel and equipment hatches may become very-high-radiation areas and are therefore provided with an area radiation monitor to provide reasonable assurance of worker safety.

During accident conditions, plant personnel are evacuated from the radiation control area. A radiation protection technician then conducts analyses using portable radiation monitors to determine the optimal routes to vital areas through the radiation control area so that personnel exposure is minimized. The radiation protection technician typically escorts maintenance personnel and operators into the radiation control area and continues to monitor radiation levels using portable

APR1400 DCD TIER 2

RAI 376-8496 - Question 12.03-49 Rev.3

RAI 116-8054 - Question 14.03.08-4

RAI 376-8496 - Question 12.03-49

RAI 281-8232 - Question 14.02-49_Rev.2

containment away from the influence of the reactor coolant system to measure high-range gamma radiation. This monitor gives operators a seismically and environmentally qualified indication of containment airborne activity. These monitors conform with the requirements of 10 CFR 50.34(f)(2)(xvii) and the criteria in Attachment 3 to Item I.I.F.1 of NUREG-0737 and NRC RG 1.97.

Insert "A" on the next page.

The monitors (RE-233A, RE-234B) transmit the radiation signals to the licensing entity via emergency response data system (ERDS) link.

One of the spent fuel pool area monitors is located on a wall and the other near the SFP bridge area.

- b. Non-safety-related area monitors (RE-205, 235, 237, 238, 245, 257, 275, 279, 284, 285, 286, 289, 292, 293, and 242B)

A post-accident primary sampling room area monitor (PR-RE-205) is provided in the auxiliary building and a normal primary sampling room area monitor (PR-RE-285) is provided in the compound building.

Two area monitors (RE-237, 238) are provided in the main steam/feedwater piping penetration area and one area monitor (RE-236) is provided in the containment personnel access hatch.

An area monitor is provided for the main control room (RE-275) and Technical Support Center (PR-RE-279) to measure gross gamma dose rates.

radiochemistry lab area

Other areas where an area monitor is provided are the in-core instrument area (RE-235), hot machine shop area (RE-293), new fuel storage area (RE-245), low-level lab area (RE-257), calibration facility area (RE-286), waste drum storage area (RE-292), compound building truck bay area (RE-289), and dry active waste storage area (RE-284) in compound building.

(RE-288, 289)

12.3.4.1.6 Range and Alarm Setpoints

The ranges of the ARMS are shown on Table 12.3-6. Alarm setpoints for safety-related monitors are determined by plant procedures and the Offsite Dose Calculation Manual (ODCM). The setpoint methodology includes the relationship between the analytical limit, setpoint, and channel uncertainty. The setpoint methodology also provides channel

Insert "B" and "C" on the next page.

A

The containment operating area monitors (RE-231A and 232B) are located near El. 160' directly above the refueling pool. The containment upper operating area monitors (RE-233A and 234B) are azimuthally 180° apart and located just below the containment polar crane rail support girder (near El.230'). Thus, the two monitors have a wide open, unobstructed overview of the entire containment free air volume. The location of RE-231A, RE-232B, RE-233A, and RE-234B is shown in Figure 11.5-2A.

The location of RT-231A and RT-233A is shown in Figure 11.5-2BB.

The location of RT-232B and RT-234B is shown in Figure 11.5-2M.

The location of RE/RT-241A and RE/RT-242B is shown in Figure 11.5-2O.

B

The location of RE/RT-205 is shown in Figure 11.5-2D.

The in-core instrument (ICI) area monitor, RE-235, is a radiation monitor for the ICI seal table area. The seal table is located at Elevation 130'-0" near the integrated head assembly lift rig. The monitor is located above the water level (concrete floor level) of 156'-0" and the monitor is at 6'-6" off the 156' level because the seal table area is flooded and is submerged under water during refueling operations. RE-235 is located directly overlooking the seal table. Containment personnel access hatch area monitor, RE-236 is located on the containment wall near the personnel access hatch at Elevation 160'-6". The location of RE-235 and RE-236 is shown in Figure 11.5-2A.

The location of RT-235, RT-236, and RE/RT-245 is shown in Figure 11.5-2O.

The location of RE/RT-237 is shown in Figure 11.5-2L.

The location of RE/RT-238 is shown in Figure 11.5-2K.

The location of RE/RT-257 and RE/RT-285 is shown in Figure 11.5-2S.

The location of RE/RT-275 and RE/RT-279 is shown in Figure 11.5-2N.

The location of RE/RT-284, RE-288, RT-288, RE-289, RT-289, RE-292, and RT-292 is shown in Figure 11.5-2T.

~~The location of RE/RT-286 is shown in Figure 11.5-2R.~~

The location of RE-293 and RT-293 is shown in Figure 11.5-2U.

RAI 376-8496 - Question 12.03-49

RAI 376-8496 - Question 12.03-49_Rev.1

RAI 376-8496 - Question 12.03-49 Rev.2

C

c. Alarm location and function of the area monitors

The RT of the area radiation monitor is equipped with alarm components such as beacon light (RL) as a visual alert and a horn alarm (RAH) as an audible alarm.

For the containment operating area and the containment upper operating area monitors (RE-231A, 232B, 233A, and 234B), the local alarms are located at the locations of the RE and at the location of the RT.

Common combined RL/RAHs for RE-231A, 232B, 233A, and 234B are located in the containment operating area (RL/RAH-1) and another one (RL/RAH-2) outside the containment building near the personnel access hatch as shown in Figures 11.5-2A and 11.5-2O. RL/RAH-1 and RL/RAH-2 are in addition to an individual RL/RAH for each RT (RT-231A, 232B, 233A, and 234B) in the Auxiliary Building as shown in Figures 11.5-2M and 11.5-2BB. The common inboard alarm alerts the operation and maintenance crew in the containment operating area to exit the containment and also warns the crew outside to limit the access to the containment building.

For the in-core instrument area monitor (RE-235), two local alarms are provided, one located at the location of the RE and the other one at the location of the RT outside the personnel access hatch as shown in Figures 11.5-2A and 11.5-2O. The local alarm in the in-core instrument seal table area alerts the crew to exit the area and also warns the crew outside to limit access to the area inside containment.

For the containment personnel access hatch area monitor (RE-236), the local alarm is located at the location of the RT outside the personnel access hatch as shown in Figures 11.5-2A and 11.5-2O. The local alarm of the RT alerts the crew outside about high radiation condition inside the personnel access hatch. This alarm at the outboard side of the access hatch alerts the plant crew prior to entering the containment through the access hatch. Since the containment evacuation alarms provided by RL/RAH-1 from RE-231A, 232B, 233A and 234B, a local alarm near RE-235 is not necessary.

For the hot machine shop area monitor (RE-293), the local alarm is located at the location of the RE and at the location of the RT as shown in Figure 11.5-2U.

For the truck bay area monitor (RE-288 and RE-289) and the waste drum storage area monitor (RE-292), the local alarm is located at the location of the RE and at the location of the RT as shown in Figure 11.5-2T.

RAI 376-8496 - Question 12.03-49

RAI 376-8496 - Question 12.03-49_Rev.1

RAI 376-8496 - Question 12.03-49_Rev.3

and

For the Post-accident primary sample room area monitor (RE-205), the Main steam and FW containment piping penetration area monitors (RE-237 and RE-238), the Spent fuel pool area monitor (RE-241A and RE-242B), the New fuel storage area monitor (RE-245), the Radiochemistry lab area monitor (RE-257), the Main control room area monitor (RE-275), the TSC area monitor (RE-279), the Compound building dry active waste storage area monitor (RE-284), the Normal primary sample room area monitor (RE-285), and the Instrument calibration facility area monitor (RE-286), each associated local alarm is located at each location of the RT which is installed adjacent to the RE. The local alarm alerts the crew inside about high radiation condition in the area. Some of these monitors are located in areas where the areas are continuously manned and occupied where radioactive materials are handled, stored or processed. Some are located in an open area where distinguishing the inside or outside of an area is immaterial. All these areas, therefore, would not need to distinguish the outside/inside of an area for the purpose of warning the crews before entry into the area. ~~In order to prevent inadvertent entry when an unshielded source is present in the instrument calibration facility area, this room is provided with access control in the form of a locked door with a latch bolt which can only be operated by key from the outside.~~

RAI 368-8470 - Question 14.03.08-14

APR1400 DCD TIER 2

RAI 116-8054 - Question 14.03.08-4

RAI 376-8496 - Question 12.03-49_Rev.3

Function and Remarks
Display & Alarm
at MCR/RSR/Local

Yes/Yes/Yes

Table 12.3-6 (2 of 3)

Radiochemistry lab

Description	Tag No.	Class ⁽¹⁾				Range					Function and Remarks
		S	SE	Q	E	Airborne Particulate	Iodine	Gas	Liquid	Area ⁽²⁾ (mSv/hr)	
Containment personnel access hatch area	RE-236	N	II	A	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)
Spent fuel pool area	RE-241A RE-242B	3	I	Q	A B	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	<ul style="list-style-type: none"> Alarm (MCR, local) FHEVAS
New fuel storage area	RE-245	N	II	A	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)
Hot machine shop	C-RE-293	N	III	S	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)
Low-level lab	RE-257	N	III	S	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)
Instrument calibration facility	C-RE-286	N	III	S	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)
Main control room area	RE-275	N	II	A	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)
TSC area	RE-279	N	III	S	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)
Truck bay	C-RE-289	N	III	S	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)
Waste drum storage area	C-RE-292	N	III	S	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)
Compound building dry active waste storage area	C-RE-284	N	III	S	N	N/A	N/A	N/A	N/A	10 ⁻³ ~ 10 ²	Alarm (MCR, local)

Deleted

Retain

Deleted

Truck bay area

C-RE-288
C-RE-289

Delete from the table

APR1400 DCD TIER 2

RAI 376-8496 - Question 12.03-49

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2A Location of Radiation Monitors at Plant (Reactor Containment Building El. 156'-0")

Page intentionally blank

APR1400 DCD TIER 2

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2D Location of Radiation Monitors at Plant (Auxiliary Building El. 55'-0")

APR1400 DCD TIER 2

RAI 376-8496 - Question 12.03-49

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2K Location of Radiation Monitors at Plant (Auxiliary Building El. 137'-6")

11.5-40

Replaced with a figure on the
next page

Rev. 0

Page intentionally blank

APR1400 DCD TIER 2

RAI 376-8496 - Question 12.03-49

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2L Location of Radiation Monitors at Plant (Auxiliary Building El. 137'-6")

Replaced with a figure on the next page

Page intentionally blank

APR1400 DCD TIER 2

RAI 376-8496 - Question 12.03-49

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2M Location of Radiation Monitors at Plant (Auxiliary Building El. 137'-6")

11.5-42

Replaced with a figure on the
next page

Rev. 0

Page intentionally blank

APR1400 DCD TIER 2

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2N Location of Radiation Monitors at Plant (Auxiliary Building El. 156'-0")

APR1400 DCD TIER 2

RAI 376-8496 - Question 12.03-49

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-20 Location of Radiation Monitors at Plant (Auxiliary Building El. 156'-0")

Replaced with a figure on the next page

Page intentionally blank

APR1400 DCD TIER 2

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2R Location of Radiation Monitors at Plant (Compound Building El. 63'-0")

APR1400 DCD TIER 2

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2S Location of Radiation Monitors at Plant (Compound Building El. 85'-0")

APR1400 DCD TIER 2

RAI 376-8496 - Question 12.03-49

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2T Location of Radiation Monitors at Plant (Compound Building El. 100'-0")

Replaced with a figure on the next page

Page intentionally blank

APR1400 DCD TIER 2

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2U Location of Radiation Monitors at Plant (Compound Building El. 100'-0")

Non-Security-Related
Information

APR1400 DCD TIER 2

RAI 225-8254 - Question 12.03-15

RAI 376-8496 - Question 12.03-49

Replaced with Figure 11.5-2BB on page 26 of 26

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 11.5-2M+1 Location of Radiation Monitors at Plant (Auxiliary Building El. 137'-6")

Added figure 11.5-2M+1

Page intentionally blank

Page intentionally blank